Часть 1

Олимпиада: **Физика, 9 класс (1 часть)**

Шифр: **21205660**

ID профиля: **853430**

Вариант 1

(v1) Чистовик.

1) $h_{max} = \frac{v_0^2 \sin^2\alpha}{2g} = \frac{v_0^2}{2g}$.

$\sin\alpha = 1$

2) l - высота от места броска, где столкнул. мячи.

$l = v_0\tau - \frac{g\tau^2}{2}$

3) $\frac{S_1}{S_2}$ S_1 - путь 1-ого

S_2 - путь 2-ого

$S_1 = h_{max} + (h_{max} - l)$

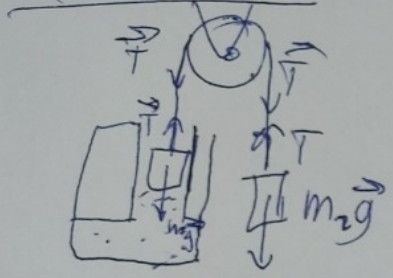
$S_2 = l$

$\frac{S_1}{S_2} = \frac{2h_{max} - l}{l} = \frac{2h_{max}}{l} - 1 = \frac{v_0^2}{g(v_0\tau - \frac{g\tau^2}{2})} - 1$

Ответ: 1) $h_{max} = \frac{v_0^2}{2g}$; 2) $l = v_0\tau - \frac{g\tau^2}{2}$; 3) $\frac{v_0^2}{g(v_0\tau - \frac{g\tau^2}{2})} - 1$

Чистовик

№2



1) $p_1 = \frac{F}{S} = \frac{mg}{S} = \frac{0{,}05\text{кг} \cdot 10\text{м/с}^2}{0{,}0008\text{м}^2} = 625\text{Па}$

2) $p = p_1 + p_0 = 625\text{Па} + 100\,000\text{Па} = 100\,625\text{Па}$

2) $\begin{cases} m_2 g = T \\ T - \rho_в g V S = mg \end{cases}$

$m_2 g = mg + \rho_в g V S$

$m_2 = m + \rho_в V S = 0{,}05\text{кг} + 1000\frac{\text{кг}}{\text{м}^3} \cdot 0{,}0008\text{м}^2 \cdot 0{,}1\text{м} =$

$= 0{,}05\text{кг} + 0{,}08\text{кг} = 0{,}13\text{кг}$

Ответ: 1) $p = 100\,625\text{Па}$; $m_2 = 0{,}13\text{кг}$.

Чистовик.

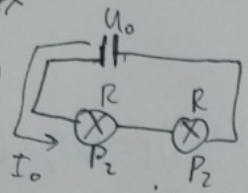
№3

$U_0 = 12$ В

$P_1 = 20$ Вт

$P_2 = 6{,}6$ Вт

2)



$I_1 = I_2 = I_0$

$R_0 = 2R$

$I_0 = \frac{U_0}{2R}$

$P_2 = I_0^2 R \Rightarrow$

$\Rightarrow R = \frac{P_2}{I_0^2}$

$R = \frac{6{,}6R^2}{36}$

$36R = 6{,}6R^2$

$6{,}6R = 36$

$R = \frac{36}{6{,}6}$

$I_0^2 = \frac{P_2}{R}$

$\frac{U_0^2}{4R^2} = \frac{P_2}{R}$

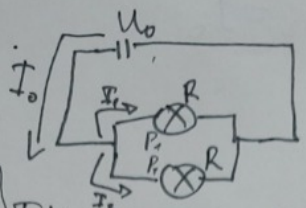
$4R P_2 = U_0^2$

$R = \frac{U_0^2}{4 \cdot 6{,}6} = \frac{144}{4 \cdot 6{,}6} = \frac{36}{6{,}6} = \frac{360}{66} = 5\frac{30}{66}$

$I_0 = \frac{U_0}{R_0} = \frac{U_0}{2R} = \frac{12 \cdot 66}{720} = 1{,}1$ (A)

$I_1 = I_2 = I_0 = 1{,}1$ (A)

1)



I_1 – ток в перв. лампе

I_2 – ток во втор. лампе

Т.к лампы одни $\Rightarrow R_1 = R_2 = R$ (перв. лампы) (втор. лампы)

$I_0 = I_1 + I_2 = 2I_1$

$I_1 = I_2$ (Т.к соединение лампы)

$P_1 = I_1^2 R \Rightarrow I_1 = \sqrt{\frac{P_1}{R}}$

$I_0 = 2I_1 = 2\sqrt{\frac{P_1}{R}} = 4\sqrt{\frac{5}{R}}$

$I_0 = \frac{U_0}{R_0} \Rightarrow 4\sqrt{\frac{5}{R}} = \frac{2U_0}{R} \Rightarrow$

$R_0 = \frac{R}{2R} = \frac{R}{2}$

$\Rightarrow \frac{16 \cdot 5}{R} = \frac{4U_0^2}{R^2} \Rightarrow 16 \cdot 5 = \frac{4U_0^2}{R} \Rightarrow$

$\Rightarrow R = \frac{4U_0^2}{16 \cdot 5} = \frac{4 \cdot 144}{16 \cdot 5} = \frac{144}{20} = 7{,}2$ Ом

$I_0 = \frac{U_0}{R_0} = \frac{2U_0}{R} = \frac{2 \cdot 12}{7{,}2} = \frac{24}{7{,}2} = \frac{240}{72} = \frac{120}{36} =$

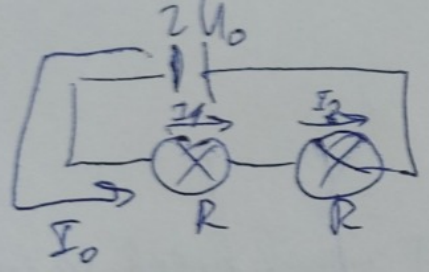
$= \frac{60}{18} = \frac{30}{9} =$

$= \frac{10}{3}$ (A)

$I_1 = I_2 = \frac{10}{6}$ (A)

(№3) Чистовик

3)



$I_1 = I_2 = I_0$

$I_0 = \frac{2U_0}{2R}$

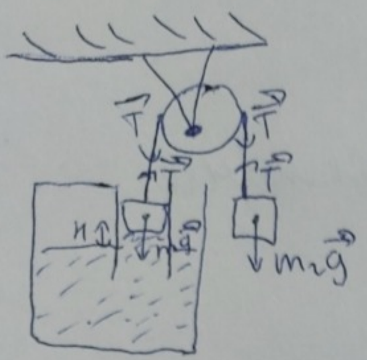
$P = \frac{(2U_0)^2}{R} = \frac{(2 \cdot 12)^2}{5\frac{30}{66}} = 105{,}6\,(\text{Вт})$

$R = 5\frac{30}{66} = \frac{360}{66}$ Ом

Ответ: 1) $I_1 = I_2 = \frac{10}{3}$ (А); 2) $I_1 = I_2 = 1{,}1$ (А); 3) $P = 105{,}6$ Вт

~~Чистовик~~ Черновик

№2



m-масса поршня

1) $p_1 = \frac{F}{S} = \frac{mg}{S} = \frac{0{,}05 кг \cdot 10 м/с^2}{0{,}0008 м^2} = 625 Па$

$P = p_1 + p_0 = 625 Па + 100000 Па = 100625 Па$

2) сила давл со стороны воды =

$= \rho_в g H \cdot S + p_0 S$

~~Т.к система в равновесии ⇒ $\begin{cases} T + \rho_в g H S = mg \\ T = m_2 g \end{cases}$~~

~~$m_2 g + \rho_в g H S = mg$~~

~~$m_2 = m - \rho_в H S -$~~

~~$m_2 = 0{,}05 кг - 1000 \frac{кг}{м^3} \cdot 0{,}1 м \cdot 0{,}0008 м^2 =$~~

Т.к система в равн-ии ⇒ $\begin{cases} T + (\rho_в g H S + p_0 S) = mg \\ T = m_2 g \end{cases}$ ⇒

⇒ $m_2 = \frac{mg - (\rho_в g H S + p_0 S)}{g} =$

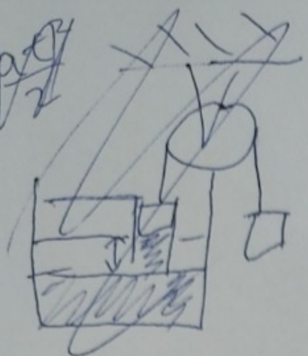
=

21205660 (U853430 M1280339)

по расти

Черновик

сила



$см \cdot см = 0{,}01 \cdot 0{,}01 =$

$1 \cdot 10^{-4}$

$0{,}0008\ м^2$

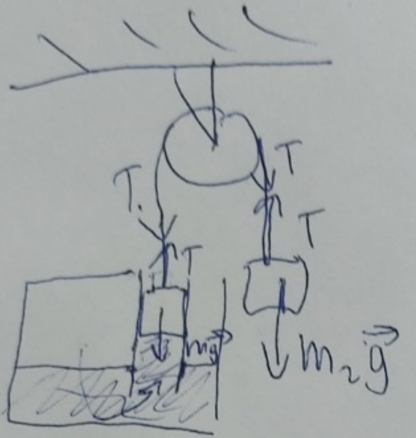
$S = 8\ см^2$

$S = 0{,}0008\ м^2$

$h = 0{,}1\ м$

$m = 0{,}05\ кг$

$\ell =$



1) $p_1 = \frac{F}{S} = \frac{mg}{S} =$

$= \frac{0{,}05\ кг \cdot 10\ м/с^2}{0{,}0008\ м^2} =$

$= \frac{0{,}5}{0{,}0008} = \frac{5000}{8} = 625\ (Па)$

$p_0 = p_1 + p_0 = 625 + 100000 = 100625$ Па

$F_A = 0$

Пусть масса шприца $= M$

2) $m_2 g = T$ $\Rightarrow m_2 g = mg \Rightarrow$

$mg = T$

$\Rightarrow m_2 = m = 0{,}05\ кг$

3) $m_2 g - (m+M)g = -(m+M)a$

2)

$p = \frac{F}{S}$

$\frac{0L}{t'6t} =$

$= \frac{0L}{S'0-08} = \frac{0L}{8'0-08+S'0}$

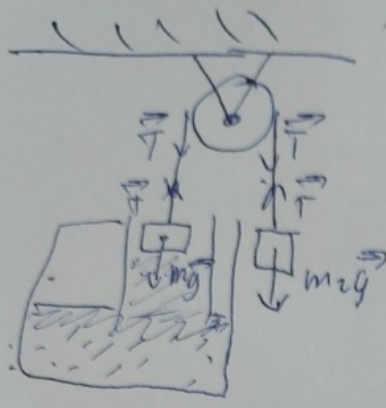
Силу давления?

0,08

80000

Черновик

№2



m - масса поршня

1) $p_1 = \frac{F}{S} = \frac{mg}{S} = \frac{0{,}05\text{кг} \cdot 10\text{м/с}^2}{0{,}0008\text{м}^2} = 625\text{Па}$

$p = p_1 + p_0 = 100625\text{Па}$

2) Т.к система в равн-ии $\Rightarrow$

$\Rightarrow \begin{cases} T = m_2 g \\ T + \rho_в g h S = mg + p_0 S \end{cases}$

$m_2 g + \rho_в g h S = mg + p_0 S$

$m_2 = \frac{mg + p_0 S - \rho_в g h S}{g} =$ ~~$\frac{0{,}5\text{Н} + 100.000\text{Па} \cdot 0{,}0008\text{м}^2 -}{}$~~

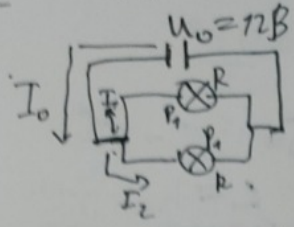
$= \frac{0{,}5\text{Н} + 100.000\text{Па} \cdot 0{,}0008\text{м}^2 - 1000\frac{\text{кг}}{\text{м}^3} \cdot 10\text{м/с}^2 \cdot 0{,}1\text{м} \cdot 0{,}0008\text{м}^2}{10\text{м/с}^2} =$

$= \frac{0{,}5\text{Н} + 80\text{Н} - 0{,}8\text{Н}}{10\text{м/с}^2} = \frac{79{,}7}{10} = 7{,}97\text{кг}$

$R_1 = R_2 = R$

$U_0 = 12В$

Черновик



$P_1 = 20Вт$

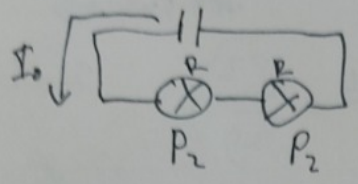
$P_2 = 5,6Вт$

$I = \frac{U}{R}$ $Q = I^2Rt$

$P = I^2R = \frac{U^2}{R^2} \cdot R = \frac{U^2}{R}$

$R_0 = \frac{R^2}{2R} = \frac{R}{2}$.

$I_0R_0 = U_0 \Rightarrow I_0 = \frac{2U_0}{R} = \frac{24}{R}$



$I_1 = I_2$
(т.к $R_1 = R_2$)

$R_0 = 2R$

$I_0R_0 = U_0$

$I_0 = \frac{U_0}{2R} = \frac{6}{R}$

$I_1^2R = 20Вт \Rightarrow I_1 = \sqrt{\frac{20}{R}}$

$I_2^2R = 20Вт$ $I_2 = \sqrt{\frac{20}{R}}$

$I_0 = I_1 + I_2$

$I_0 = \frac{2U_0}{R}$

$I_0 = 2I_1 = 2\sqrt{\frac{20}{R}} = 4\sqrt{\frac{5}{R}}$

$4\sqrt{\frac{5}{R}} = \frac{2U_0}{R}$

$16 \cdot \frac{5}{R} = \frac{4U_0^2}{R^2}$

$16 \cdot 5 = \frac{4U_0^2}{R}$

$R = \frac{4U_0^2}{16 \cdot 5} = \frac{4 \cdot 12^2}{16 \cdot 5} = \frac{144 \cdot 4}{16 \cdot 5} = \frac{144}{20} = 7,2$ Ом

$S = v_0t - \frac{at^2}{2}$

$25 = 2v_0t - at^2$

$at^2 - 2v_0t + 25 = 0$

I_1 - ток в пер
I_2 - ток во втор $\Rightarrow$

$I_1 = I_2 =$

$\frac{144}{26,4}$

$\frac{720}{66}$

Черновик

t - время до max

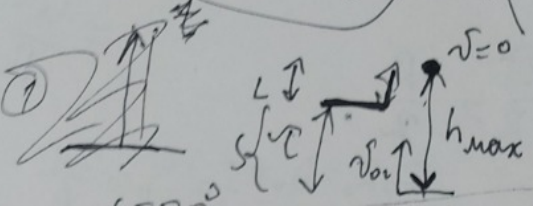
$v_{01} = v_{02}$

1) $h_{max} = v_0 t - \frac{gt^2}{2}$

от ($h_м$)

2) $S = v_0 \tau - \frac{g\tau^2}{2}$

$l + S = h_м$ $\quad l = h_м - \frac{g\tau^2}{2}$



$\alpha = 90°$

$h_м = \frac{v_0^2 \sin^2 \alpha}{2g} = \frac{v_0^2 \cdot 1}{2g} = \frac{v_0^2}{2g}$

$S = \frac{0 - v_0^2}{2g}$

$S = \frac{0 - v_0^2}{-2g} = \frac{v_0^2}{2g}$

максимум v_0?

$v_0 \tau - \frac{g\tau^2}{2} + h_м - \frac{g\tau^2}{2}$

$v_0 \tau - g\tau^2 + h_м = h_м$

2) $l = v_0 \tau - \frac{g\tau^2}{2}$ (бис)

3) $S_1 = h_{max} + (h_{max} - l)$

$S_2 = l$

$\frac{S_1}{S_2} = \frac{2h_{max} - l}{l} =$

$= \frac{\frac{2v_0^2}{2g} - v_0\tau - \frac{g\tau^2}{2}}{v_0\tau - \frac{g\tau^2}{2}} =$

$= \frac{2h_{max}}{l} - 1 =$

$\frac{S_1}{S_2} = \frac{v_0^2}{g(v_0\tau - \frac{g\tau^2}{2})} - 1$

$\frac{24^2 - 66}{360}$

576

Часть 2

Олимпиада: **Физика, 9 класс (2 часть)**

Шифр: **21205660**

ID профиля: **853430**

Вариант 1

Чистовик

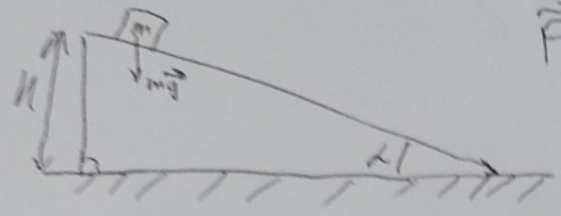
x – гладкая н-ть клина, по кот-ой скатывается шайба

(№4) 1) $\sin\alpha = \frac{H}{x} \Rightarrow x = \frac{H}{\sin\alpha}$

$\sin^2\alpha + \cos^2\alpha = 1$

$\sin^2\alpha = 1 - \frac{16}{25} = \frac{9}{25}$

$\sin\alpha = \frac{3}{5}$



$\vec{F} = m\vec{a}$

$mg\sin\alpha = ma$

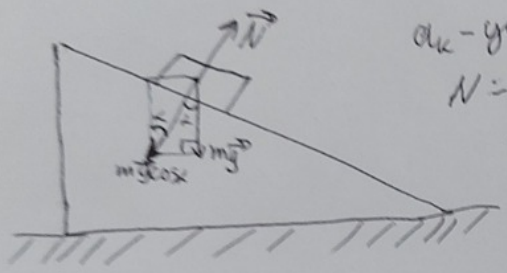
$a = g\sin\alpha$

$X = \frac{at_1^2}{2} \Rightarrow t_1^2 = \frac{2X}{a} \Rightarrow$

$\Rightarrow t_1 = \sqrt{\frac{2X}{a}} = \sqrt{\frac{2H}{\sin\alpha \cdot g\sin\alpha}} = \sqrt{\frac{2H}{\sin^2\alpha g}} = \sqrt{\frac{2H}{\frac{9}{25}g}} = \sqrt{\frac{50H}{9g}} =$

$= \sqrt{\frac{5H}{g}} = \frac{1}{3}\sqrt{5H}$ (с)

2)



$a_к$ – ускорение клина

$N = mg\cos\alpha$

$\vec{F} = m\vec{a}$

$ma_к = mg\cos\alpha \cdot \sin\alpha$

$a_к = \frac{g\cos\alpha \cdot \sin\alpha}{3} =$

$= \frac{10 \cdot \frac{3}{5} \cdot \frac{4}{5}}{3} = \frac{10 \cdot 3 \cdot 4}{25 \cdot 3} = \frac{40}{25} = \frac{8}{5} =$

$= 1{,}6$ м/с^2

3) $X = \frac{a_x t_2^2}{2} \Rightarrow t_2 = \sqrt{\frac{2X}{a_x}}$

где $a_x = a - a_к = g\sin\alpha - 1{,}6 = \frac{3 \cdot 10}{5} - 1{,}6 = 6 - 1{,}6 = 4{,}4$ м/с^2

$t_2 = \sqrt{\frac{2H}{\sin\alpha \cdot a_x}} = \sqrt{\frac{2H}{\frac{3}{5} \cdot 4{,}4}} = \sqrt{\frac{2H}{0{,}6 \cdot 4{,}4}} = \sqrt{\frac{2H}{2{,}64}} \approx$

$\approx \sqrt{0{,}76H}$ (с)

Ответ: $t_1 = \frac{1}{3}\sqrt{5H}$ (с); 2) $a_к = 1{,}6$ (м/с^2); $t_2 = \sqrt{0{,}76H}$ (с)

№5 Чистовик

$1+tg^2\alpha = \frac{1}{\cos^2\alpha}$ $\quad \cos^2\alpha = \frac{1}{1,5+\sqrt{1,25}}$

$1+tg^2\alpha = 1,5+\sqrt{1,25}$

$tg^2\alpha = 0,5+\sqrt{1,25} \Rightarrow tg\alpha = \sqrt{0,5+\sqrt{1,25}} \approx \sqrt{1,62} \approx 1,27$

3) $3H = v\cos\alpha_2 t = \frac{v\cos\alpha_2(v+\sqrt{v^2+2gH})}{g} \Rightarrow$

$\Rightarrow 3Hg = v\cos\alpha_2(v+\sqrt{v^2+2gH}) \Rightarrow \cos\alpha_2 = \frac{3Hg}{v(v+\sqrt{v^2+2gH})} =$

$= \frac{3Hg}{Hg(0,5+\sqrt{1,25})} = \frac{3}{0,5+\sqrt{1,25}}$

$1+tg^2\alpha_2 = \frac{1}{\cos^2\alpha}$ $\quad \cos^2\alpha = \frac{9}{1,5+\sqrt{1,25}} = 3,44$

$1+tg^2\alpha_2 = \frac{1,5+\sqrt{1,25}}{9}$ $\quad tg^2\alpha_2 = 3,44-1$

$tg^2\alpha_2 = 3,44$

$tg^2\alpha_2 = \sqrt{3,44} \Rightarrow tg\alpha_2 = 1,56$

$9+9tg^2\alpha_2 = 1,5+\sqrt{1,25}$

$tg^2\alpha_2 = \frac{1,5+\sqrt{1,25}-9}{9} \Rightarrow tg\alpha_2 = \frac{\sqrt{1,5+\sqrt{1,25}-9}}{3}$

$\approx -2,13$

$tg\alpha = 1,27$

Ответ: 1) за $t_1 = \frac{\pi H^3}{S\sqrt{0,5gH}}$; 2) $tg\alpha = 1,27$

$tg\alpha_2 - tg\alpha_1 = 1,56 - 1,27 = 0,29$

Ответ: $t_1 = \frac{\pi H^3}{S\sqrt{0,5gH}}$; 2) $tg\alpha = 1,27$; 3) 0,29

Чистовик

№5

1) $V_{бака} = \pi \cdot H \cdot \pi \cdot H^2 = \pi H^3$

$V_1 = v S t_1 = \sqrt{0{,}5gH}\, S t$

V_1 - объём, который накачали в бак за время t_1

$V_{бака} = V_1$

$\pi H^3 = S t_1 \sqrt{0{,}5gH} \Rightarrow t_1 = \dfrac{\pi H^3}{S\sqrt{0{,}5gH}}$

2) $H = \dfrac{v^2 \sin 2\alpha}{g}$

$\sin 2\alpha = \dfrac{Hg}{v^2} = \dfrac{Hg}{0{,}5gH} = \dfrac{1}{0{,}5} = 2$

$\sin 2\alpha = 2$

$2\cos\alpha \cdot \sin\alpha = 2$

$\cos\alpha \cdot \sin\alpha = 1$

2) $0 = H + vt - \dfrac{gt^2}{2} \Rightarrow gt^2 - 2vt = 2H$

$gt^2 - 2vt - 2H = 0$

$D = 4v^2 + 4g \cdot 2H = 4(v^2 + 2gH)$

$t = \dfrac{2v + 2\sqrt{v^2 + 2gH}}{2g} = \dfrac{v + \sqrt{v^2 + gH}}{g}$

$H = v\cos\alpha\, t = \dfrac{v\cos\alpha \cdot (v + \sqrt{v^2 + 2gH})}{g} \Rightarrow$

$\Rightarrow Hg = v\cos\alpha (v + \sqrt{v^2 + 2gH})$

$\cos\alpha = \dfrac{Hg}{v(v + \sqrt{v^2 + 2gH})} = \dfrac{Hg}{0{,}5gH + \sqrt{1{,}25g^2H^2}} = \dfrac{Hg}{Hg(0{,}5 + \sqrt{1{,}25})} = \dfrac{1}{0{,}5 + \sqrt{1{,}25}}$

Черновик

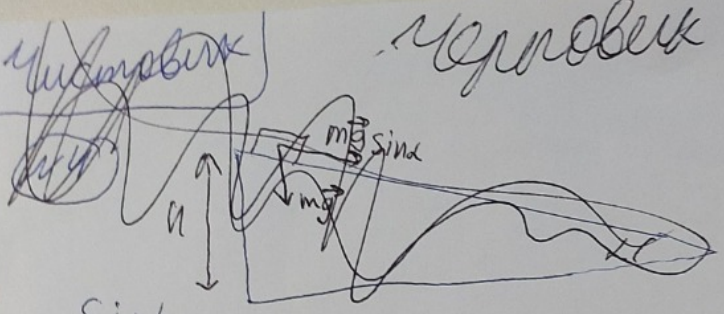
$$Mg = v\cos\alpha\left(v + \sqrt{v^2 + 2gH}\right)$$

$$\cos\alpha = \frac{Mg}{v\left(v + \sqrt{v^2 + 2gH}\right)} = \frac{Mg}{0{,}5gH + \sqrt{0{,}5gH \cdot (0{,}5gH + 2gH)}} =$$

$$= \frac{Mg}{0{,}5gH + \sqrt{0{,}5^2 g^2 H^2}\sqrt{0{,}5gH \cdot 2{,}5}} = \sqrt{1{,}25g^2H^2}$$

$$\frac{Mg}{Mg\left(0{,}5 + \sqrt{1{,}25}\right)} = \frac{1}{0{,}5 + \sqrt{1{,}25}}$$

Человек



	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$
	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$

$\sin(\alpha+\alpha) = \sin\alpha\cdot\cos\alpha + \cos\alpha\cdot\sin\alpha = 2\cos\alpha\cdot\sin\alpha$

$\alpha \neq 0; 90^\circ$

$\sin 2\alpha = 2$

$2\cos\alpha\cdot\sin\alpha = 2$

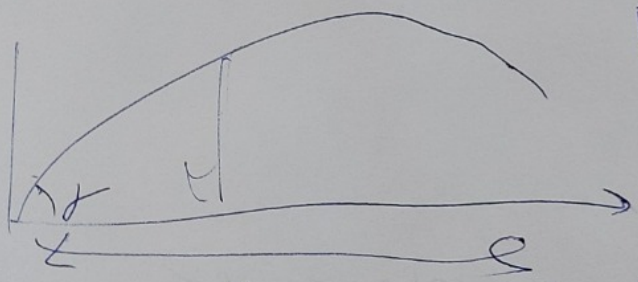
$\cos\alpha\cdot\sin\alpha = 1$ | $\cos^2\alpha$

$tg\alpha = \frac{\sin\alpha}{\cos\alpha}$

	30	60	90
sin	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$
cos	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$

$\frac{\sin\alpha}{\cos\alpha} = \frac{1}{\cos^2\alpha}$

$tg\alpha = \frac{1}{\cos^2\alpha}$



$H = \frac{v^2\sin^2\alpha}{g}$

$\sin 2\alpha = \frac{mg}{v^2} = \frac{Hg}{3,5gH} = \frac{1}{0,5} = 2$

$L = v_x t = v_0\cdot\cos\alpha\, t = \frac{2v_0^2\sin\alpha\cdot\cos\alpha}{g}$

$v_0 = 2\sqrt{v^2+gH}$

$t = \frac{2v_0\sin\alpha}{g}$

$\sin 45 = \frac{x}{x\sqrt{2}}$

$\frac{gt^2}{2} - vt = H$

$\cos\alpha\cdot\sin\alpha = 1$

$gt^2 - 2vt - H = 0$

$\cos 45\cdot\sin 45 = 1$

$D = 4v^2 + 4gH$

$t = \frac{2v + 2\sqrt{v^2+gH}}{2g}$

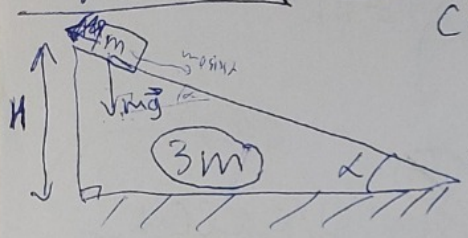
$\frac{1}{2}\cdot 2$

$v_y = v_0\sin\alpha - gt$

$0 = H + vt - \frac{gt^2}{2}$

$= \frac{v + \sqrt{v^2+gH}}{g}$

Человек. (m)



$\cos\alpha = \frac{4}{5} = 0{,}8$

$0{,}8^2 + \sin^2\alpha = 1$

$\sin\alpha = \sqrt{1 - 0{,}8^2}$

1) $a_{клина} = 0$

$\sin\alpha = \frac{H}{x} \Rightarrow$

$\Rightarrow x = \frac{H}{\sin\alpha}$

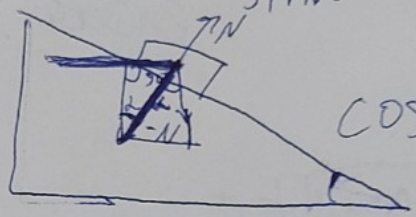
x - гипотенуза клина, по кот. скатыв. шайба

$F_{тр} = 0$

$\vec{F} = m\vec{a}$

$ma = mg\sin\alpha$

$a = g\sin\alpha$



$\cos^2\alpha + \sin^2\alpha = 1$

$\sin^2\alpha = 1 - \cos^2\alpha$

$\sin^2\alpha = 1 - \frac{16}{25} = \frac{9}{25}$

$x = \frac{at^2}{2} \Rightarrow$

$\Rightarrow t^2 = \frac{2x}{a}$

$t = \sqrt{\frac{2x}{a}} \Rightarrow t = \sqrt{\frac{2H}{\sin\alpha \cdot g\sin\alpha}} =$

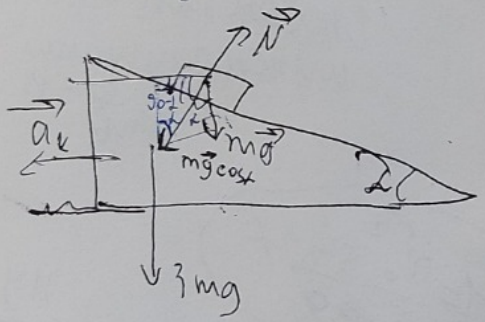
$t = -\sqrt{\frac{2x}{a}}$ - н.к.

$= \sqrt{\frac{2H}{\sin^2\alpha g}} =$

$\sin\alpha = \frac{x}{mg\cos\alpha} \Rightarrow x = mg\cos\alpha \cdot \sin\alpha$

$= \sqrt{\frac{2H}{\frac{9}{25}g}} = \sqrt{\frac{50H}{9g}} =$

$= \sqrt{\frac{5H}{9}} = \frac{1}{3}\sqrt{5H}$



$a_к$? $N = mg\cos\alpha$

$3ma_к = mg\cos\alpha \cdot \sin\alpha$

$a_к = \frac{g\cos\alpha \cdot \sin\alpha}{3} = \frac{10 \cdot \frac{3}{5} \cdot \frac{4}{5}}{3} =$

$= \frac{10 \cdot 3 \cdot 4}{25 \cdot 3} = \frac{40}{25} = \frac{8}{5}$ м/с^2 =

$= 1{,}6$ м/с^2

$X = \frac{a_к t^2}{2}$

$(g - \sin\alpha) - a_к$

$\frac{2}{0{,}6 \cdot 4{,}4} = \frac{2}{2{,}64}$

черновик

$S\cdot H = \pi R^2$

1) $V_{бака} = H\cdot\pi H^2 = \pi H^3$

$V_1 = v\cdot S\cdot t = \sqrt{0{,}5gH}\,S t$

~~t - время~~

V_1 - объём, котор. накачив в бак за время t

$V_{бака} = V_1$

$\pi H^3 = S\sqrt{0{,}5gH}\,t \Rightarrow$

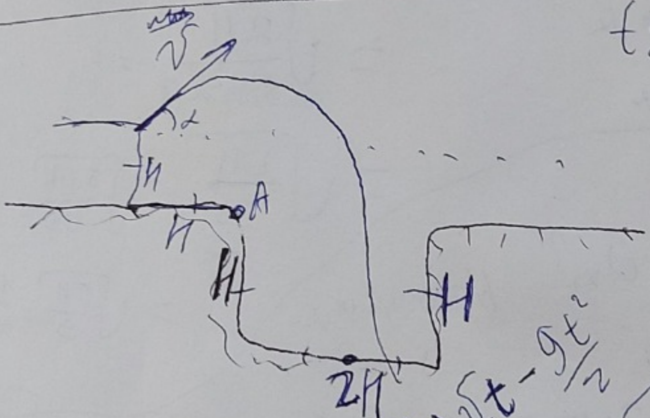
$\Rightarrow t = \frac{\pi H^3}{S\sqrt{0{,}5gH}}$

$1 + tg^2\alpha = \frac{1}{\cos^2\alpha}$

$H = \frac{v_0\cos\alpha\cdot(v + \sqrt{v^2 + gH})}{g} \Rightarrow$

$\Rightarrow Hg = v\cos\alpha($

$tg\,\alpha$

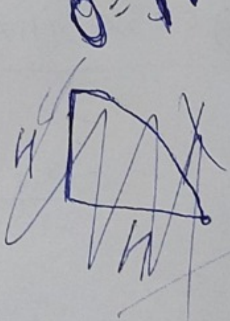


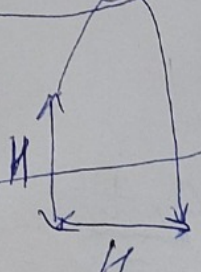
Чтобы поп в т. A нужно пройти путь s = H

$0 = H + v_0 t - \frac{gt^2}{2}$

$H = \frac{v_0^2\sin 2\alpha}{g}$

$\sin 2\alpha = \frac{Hg}{0{,}5gH} = \frac{1}{0{,}5} = 2$





$tg\,\alpha = 1 + tg^2\alpha$

$tg^2\alpha - tg\,\alpha + 1 = 0$

$\sin 2\alpha = \frac{Hg}{v^2}$

$Hg = v_0^2\sin 2\alpha$

$H = \frac{v_0^2\sin 2\alpha}{g}$